भारतीय मानक

IS 7541 : 2023

Indian Standard

स्थिर तरल सल्फर ट्राइऑक्साइड — विशिष्टि

(पहला पुनरीक्षण)

Stabilized Liquid Sulphur Trioxide — Specification

(First Revision)

ICS 71.060.50

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Inorganic Chemicals Sectional Committee, CHD 01

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Inorganic Chemicals Sectional Committee had been approved by the Chemical Division Council.

Stabilized liquid sulphur trioxide is widely used as sulphonating agent in chemical industry. It solidifies at or below 16.8 °C.

This standard was originally published in 1974. In this first revision, instrumental test method for the determination of iron has been added as alternate test method. Also, Packing and Marking clause has been updated. Further, Reference clause has been incorporated.

The composition of the Committee responsible for formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

STABILIZED LIQUID SULPHUR TRIOXIDE — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for stabilized liquid sulphur trioxide, used as sulphonating agent in chemical industry.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this Indian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

IS No.	*Title*
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 3025 (Part 2) : 2019/ ISO 11885 : 2007	Methods of sampling and test (physical and chemical) for water and wastewater: Part 2 Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (*first revision*)
IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 5165 : 2017	Laboratory glassware — Interchangeable conical ground joints (*first revision*)
IS 6052 : 1988	Specification for glass condensers (*first revision*)

3 REQUIREMENTS

3.1 Description

The material shall be a transparent liquid. It shall be colourless or have a brownish tinge, free from suspended matter and visible impurities.

3.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods given in Annex A. References to the relevant clauses of the Annex are given in col (4) of the Table 1.

4 PACKING AND MARKING

4.1 Packing

4.1.1 The material is generally packed in mild steel tankers, insulated if necessary. Other packings may be used if agreed to between the manufacturer and the purchaser, subject to the provisions of *Red Tariff No. 18* of 1960 issued by the Indian Railways Conference Association, with any alteration or addition made thereafter.

4.1.2 When the material is supplied in ground glass bottles the stoppers shall be secured with a metal wire. The stoppers shall further be sealed by a putty made of China clay or a mixture of sodium silicate and asbestos flour.

4.1.3 The bottles and jars shall be packed in suitable pent top packing cases. These shall be placed in an upright position on one layer of sand, or ashes free from cinders, or dry earth, and the empty surrounding space shall also be filled with the same material to prevent movement.

4.1.3.1 The material shall be stored between 17 °C and 30 °C.

4.2 Marking

4.2.1 The containers and also the packages shall be suitably marked in red letters not less than 2.5 cm high, and drums and tank wagons shall be marked in red letters not less than 5 cm high, showing the name of the material, manufacturer's name, the mass of the material, recognized trademark, if any, and the month and the year of manufacture; and shall prominently display the words:

'CORROSIVE, HANDLE WITH CARE'

4.2.2 The packages shall be marked with the percent content (*m/m*) of the stabilizer and, if the stabilizer is acidic to methyl red indicator, the volume of 0.5 N sodium hydroxide solution required to neutralize the stabilizer present in 100 g of the material.

4.2.3 The packages shall be labelled as shown in Fig. 1.

Table 1 Requirements for Stabilized Liquid Sulphur Trioxide

(*Clause* 3.2 *and* A-4.2.3.2)

Sl No.	Characteristic	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Free sulphur trioxide, percent by mass, *Min*	99.2	**A-2**
ii)	Sulphuric acid (as H_2SO_4), percent by mass, *Max*	0.4	**A-3**
iii)	Iron (as Fe), ppm, *Max*	100	**A-4** or **A-6**
iv)	Oxidizable impurities (as SO_2), percent by mass, *Max*	0.2	**A-5**

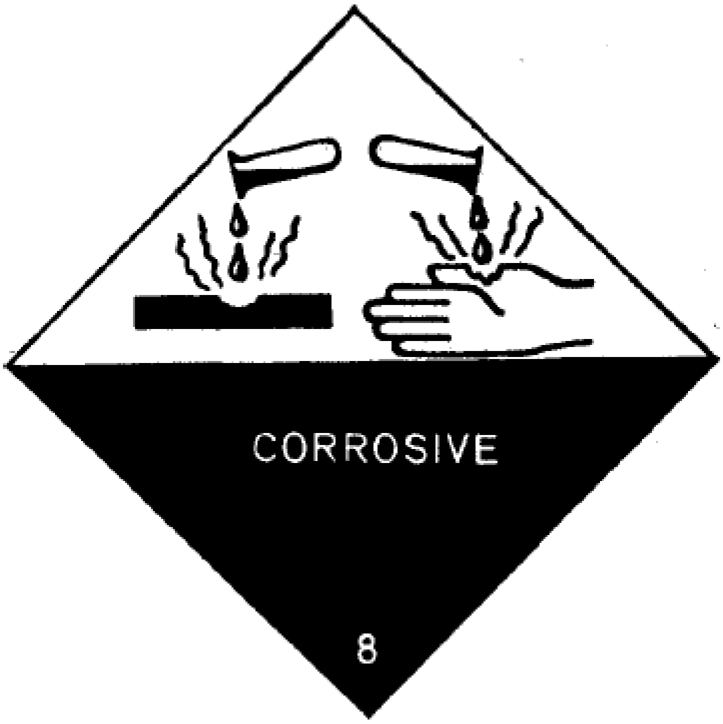

FIG. 1 SYMBOL SHOWING DANGER OF CORROSION

4.2.4 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

5 SAMPLING

Representative test samples of the material shall be drawn as prescribed in Annex B.

ANNEX A

(*Clause* 3.2)

METHODS OF TEST FOR STABILIZED LIQUID SULPHUR TRIOXIDE

A-1 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be used in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2 DETERMINATION OF FREE SULPHUR TRIOXIDE

A-2.1 Apparatus

The apparatus prescribed under **A-2.1.1** to **A-2.1.5** shall be fitted with suitable ground glass joints (*see* IS 5165).

A-2.1.1 *Flask* — 125 ml capacity, provided with a stopper

A-2.1.2 *Connecting Tube* — in the shape of an inverted U-tube

A-2.1.3 *Water Condenser* — *see* IS 6052

A-2.1.4 *Glass Adaptor*

A-2.1.5 *Receiver Flask* — with a narrow neck for collecting liquid sulphur trioxide

A-2.1.6 *Heating Mantle* — a hemispherical heating mantle to fit the flask

A-2.1.7 *Variable Transformer* — to adjust the known input into the heating mantle

A-2.2 Procedure

A-2.2.1 Add 3 glass to 4 glass beads to the thoroughly dry flask, stopper the flask, and weigh. Remove the stopper and insert the funnel in the flask. Pour about 100 g of the sample into the flask. Remove the funnel, stopper the flask, and weigh it. Connect the flask by means of the connecting tube to the water condenser and place the receiver under the end of the adaptor to collect liquid sulphur trioxide. Place the flask in the heating mantle and adjust the temperature (about 45 °C to 50 °C) so that the sample boils gently. Do not attempt to heat on a steam or water-bath.

A-2.2.2 When evolution of sulphur trioxide fumes ceases, cool the flask, remove the connecting tube and quickly blow out of the flask the sulphur trioxide vapours with a stream of thoroughly dried air. Dry the inside of the neck of the flask with a stream of thoroughly dried air; restopper with the original stopper and weigh the residue. Retain the stoppered flask with the residue for test in **A-3**.

A-2.3 Calculation

Free sulphur trioxide, percent by mass

$$= \frac{100\ (M_2 - M_1)}{M_2}$$

where

M_2 = mass, in g, of the material taken for the test; and

M_1 = mass, in g, of the residue.

A-3 DETERMINATION OF SULPHURIC ACID

A-3.1 Reagents

A-3.1.1 *Standard Sodium Hydroxide Solution* — 0.5 N

A-3.1.2 *Methyl Red Indicator*

Dissolve 0.1 g of methyl red in 100 ml of rectified spirit.

A-3.2 Procedure

A-3.2.1 Carefully add about 30 ml of water to the stoppered flask containing the residue (*see* **A-2.2.2**) and allow to stand until all mist has been absorbed. Transfer the solution to a 100 ml volumetric flask and make the volume up to the mark by washings of the flask. Use this solution for tests given in **A-3.2.2**, **A-4.2** and **A-4.3**.

A-3.2.2 Take 20 ml of the solution in a flask with the help of a pipette. Titrate the solution against standard sodium hydroxide solution using methyl red as indicator. Apply a correction for the volume of sodium hydroxide solution used by the stabilizer.

A-3.3 Calculation

Sulphuric acid (as H_2SO_4), percent by mass

$$= \frac{4.9\ (5\ \mathrm{N}\, V - 0.5\, V_1)}{M}$$

where

N = normality of standard sodium hydroxide solution;

V = volume, in ml, of standard sodium hydroxide solution used in the titration in **A-3.2.2**;

V_1 = volume, in ml, of standard sodium hydroxide of normality 0.5 N that would be consumed by the stabilizer present in Mg of the sample (*see* **A-3.2.2**); and

M = mass, in g, of the sample taken for the test in **A-2.2**.

A-4 DETERMINATION OF IRON

A-4.1 General

Two methods are prescribed. Method A is the referee method and Method B is the alternate method.

A-4.2 Method A

A-4.2.1 *Apparatus*

A-4.2.1.1 *Nessler tubes* — 50 ml capacity

A-4.2.2 *Reagents*

A-4.2.2.1 *Ammonium persulphate*

A-4.2.2.2 *Concentrated hydrochloric acid*

A-4.2.2.3 *Butanolic potassium thiocyanate solution*

Dissolve 10 g of potassium thiocyanate in 10 ml of water. Add sufficient n-butanol to make up to 100 ml and shake vigorously until the solution is clear.

A-4.2.2.4 *Standard iron solution A*

Weigh, to the nearest 1 mg, 7.022 gm of iron (II) ammonium sulphate hexahydrate and place in a beaker of suitable capacity. Add 50 ml of sulphuric acid (about 2 N) and transfer quantitatively to a 500 ml one mark volumetric flask. Dilute to the mark and mix thoroughly. 1 ml of this solution contains 200 mg of iron as Fe.

A-4.2.2.5 *Standard iron solution B*

Transfer 500 ml of the standard iron solution A to a 500 ml one mark volumetric flask, add 5 ml of sulphuric acid (about 2 N), dilute to the mark and mix thoroughly. 1 ml of this solution contains 0.20 mg of iron as Fe. The solution should be prepared just before use.

A-4.2.3 *Procedure*

A-4.2.3.1 Pipette out 10 ml of the solution reserved in **A-3.2.1**, into a Nessler tube. Add about 30 mg of ammonium persulphate, 1 ml of concentrated hydrochloric acid and 15 ml of butanolic potassium thiocyanate solution. Make up to 50 ml, shake vigorously for 30 s and allow the layers to separate. Carry out a control test in another Nessler tube in the same manner using 5 ml of standard iron solution B and compare the intensity of colour produced in the butanol layers in the two tubes.

A-4.2.3.2 The limit prescribed in Table 1 shall be taken as not having been exceeded if the intensity of the red colour produced in the butanol layer with the sample is not greater than that produced in the control test.

A-4.3 Method B

A-4.3.1 *Apparatus*

A-4.3.1.1 *Spectrophotometer or photoelectric colorimeter*

A-4.3.2 *Reagents*

A-4.3.2.1 *Hydrochloric acid* — approximately 1 N

A-4.3.2.2 *Hydroxyl ammonium chloride solution*

Dissolve 10 g of hydroxyl ammonium chloride in water and dilute to 100 ml.

A-4.3.2.3 *Ammonium acetate solution*

Dissolve 30 g of ammonium acetate in water and dilute to 100 ml.

A-4.3.2.4 *Bi pyridyl solution*

Dissolve 1 g of 2, 2'-bipyridyl in 10 ml of approximately 1 N hydrochloric acid solution and dilute to 100 ml.

A-4.3.2.5 *Standard iron solution C*

Transfer 50.0 ml of standard iron solution B to a 1 000 ml one mark volumetric flask, dilute to the mark and mix thoroughly. One ml of this solution contains 10 µg of Fe. The solution should be prepared just before use.

A-4.3.3 *Procedure*

A-4.3.3.1 *Preparation of calibration curve*

Into each of a series of 100 ml one mark volumetric flasks, place the quantities of standard iron solution C indicated below:

Sl No.	*Standard Iron Solution C* (ml)	*Corresponding to Fe* (µg)
(1)	(2)	(3)
i)	0 (Compensation solution)	0
ii)	5.0	50
iii)	7.5	75
iv)	10.0	100
v)	12.5	125
vi)	15.0	150
vii)	17.5	175
viii)	20.0	200
ix)	25.0	250

Add to each volumetric flask an amount of water sufficient to dilute to approximately 50 ml, then 2 ml of hydrochloric acid solution, 2 ml of hydroxyl ammonium chloride solution and after 5 min, 5 ml of ammonium acetate solution and 1 ml of the 2, 2'-bipyridyl solution. Dilute to the mark, mix thoroughly and wait for 10 min. Carry out the measurement in the spectrophotometer in a 1 cm cell at a wavelength of about 522 mm, or in a photoelectric colorimeter using an appropriate filter, adjusting the instrument to zero optical density using as reference the compensation solution. Prepare a calibration chart having for example the iron content in micrograms per 100 ml of the standard matching solution as abscissae and the corresponding values of optical density as ordinates.

A-4.3.3.2 Transfer quantitatively to a 100 ml one mark volumetric flask 20 ml of solution prepared in **A-3.2.1** and 2 ml of hydrochloric acid, dilute to the mark, mix and filter if necessary. Transfer an aliquot of the sample solution containing between 50 µg and 200 µg of iron, to a 100 ml one mark volumetric flask. Dilute to approximately 50 ml if necessary, then add successively 2 ml of hydrochloric acid solution, 2 ml of the hydroxyl ammonium chloride solution and, after 5 min, 5 ml of ammonium acetate solution and 1 ml of 2, 2'-bipyridyl solution. Dilute to the mark, mix and wait for 10 min. Carry out the spectrophotometric measurement according to the procedure given in **A-4.3.3.1** adjusting the instrument to zero optical density using as reference the blank test solution (*see* **A-4.3.3.3**). Alternatively, colour may also be compared using a photoelectric colorimeter.

A-4.3.3.3 *Blank test*

At the same time as the analysis, carry out a blank test using the same procedure and quantities of all reagents employed in the test.

A-4.3.4 *Calculation*

By reference to the calibration chart (*see* **A-4.3.3.1**) determine the iron content corresponding to the spectrophotometric measurement.

The iron content is calculated by the following formula:

$$\text{Iron (Fe), percent by mass} = \frac{A \times 100 \times 100}{V \times M}$$

where

A = mass, in g, of iron determined in the aliquot of the sample solution;

V = volume, in ml, of the sample solution taken for the colour reaction; and

M = mass, in g, of the test portion (**A-2.2**).

A-4.4 Alternative Method

Iron may alternatively be determined by instrumental test method as prescribed in **A-6**.

A-5 DETERMINATION OF OXIDIZABLE IMPURITIES

A-5.1 Apparatus

A-5.1.1 *Flask* — 125 ml capacity, with a stopper

A-5.1.2 *Ice Bath* — a porcelain dish with ice cold water

A-5.2 Reagents

A-5.2.1 *Standard Potassium Permanganate Solution* — 0.1 N

A-5.3 Procedure

Weigh the dry flask with stopper. Remove the stopper, insert a funnel in the flask, and pour about 50 g of the sample into the flask. Stopper the flask and weigh again. Cool the flask in ice cooled water for 30 min, and then replace the original stopper with a bored rubber cork. Insert the tip of a burette containing standard potassium permanganate solution through the bore of the cork into the flask, keeping it in ice cooled water bath. Run the permanganate solution from the burette into the flask drop by drop shaking the contents of the flask vigorously during the titration to avoid spurting of liquid sulphur trioxide. The end point is seen visually when the solution acquires a slight pink colour.

A-5.4 Calculation

Oxidizable impurities (SO_2), percent by mass

$$= \frac{3.2 \times V \times \mathrm{N}}{M}$$

where

V = volume, in ml, of standard permanganate solution used;

N = normality of standard permanganate solution; and

M = mass, in g, of the sample taken for the test.

A-6 DETERMINATION OF IRON BY INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETER (ICP-OES) METHOD

A-6.1 Principle

The sample solution under analysis is nebulized through a nebulizer inside a spray chamber. The aerosol formed is aspirated to argon plasma torch [produced by a radio-frequency inductively coupled

plasma (ICP)], where the molecules break into constituent atoms and/or molecular species and atoms are get excited. These excited atoms then return back to the lower energy state by emitting radiation of specific wavelength. These emitted radiations are characteristic of an element and are measured by the photomultiplier tube detector and intensity of such emitted radiation is directly proportional to the concentration of respective constituent element in the sample**.**

A-6.2 Recommended Wavelength, Limit of Quantification and Important Spectral Interferences

Elements along with the recommended wavelengths and typical estimated limits of quantification are listed in Table 2. Actual working detection limits are dependent on the type of instrumentation, detection device and sample introduction system used and on the sample matrix. Therefore, these concentrations can vary between different instruments.

Table 2 Recommended Wavelengths, Achievable Limits of Quantification for Different Configuration of Instruments and Important Spectral Interferences

(*Clause* A-6.2)

Sl No.	**Element**	**Wavelength** (nm)	**Approximately Achievable Limits** Radial viewing (µg)	Axial viewing (µg)	**Interfering Elements**
(1)	(2)	(3)	(4)	(5)	(6)
i)	Fe	238.204	14	(3)	Co
		259.940	6	2	Co
		271.441	—	—	—

A-6.3 Reagents and Solutions

A-6.3.1 *Nitric Acid* (*65 Percent*) *Suprapure*

A-6.3.2 *Standard Stock Solution*

Either prepare by dissolving proportionate amount of soluble compounds of elements (preferably spectroscopic grade), or use commercially available certified stock solution of 10 µg/ml, 100 µg/ml or 1 000 µg/ml of Iron in 2-5 percent nitric acid. It is preferable to prepare single stock solution of multi elemental standards for analysis.

A-6.3.3 *Standard Solution*

Pipette out 5 ml from 100 µg/ml standard stock solution into a 100 ml volumetric flask and make up volume with 2 percent nitric acid to prepare 5 µg/ml solution. From this 5 µg/ml solution, an aliquot of 1.0 ml, 3.0 ml and 5.0 ml taken in 50 ml volumetric flasks (separate) and make up volume with 2 percent nitric acid to prepare 0.1, 0.3 and 0.5 µg/ml solution of respective elements under reference.

A-6.3.4 *Sample Preparation*

Weigh about 2.5 g sample in a 50 ml volumetric flask and add 1.0 ml nitric acid and make up the volume with water.

NOTE — Sample should be clear before injecting to the instrument.

A-6.3.5 *Reagent Blank Solution*

Place 50 ml of nitric acid and 1 000 ml of water into an HDPE or PP container. For ultra-trace analysis, polytetrafluorethylene (PTFE) containers should be used. Prior to analysis, make sure that the acid matrix and concentration of the reagent blank solution is the same as in the standard and sample solutions.

A-6.4 Instrument

Set up the instrument as per the manufacturer's instructions manual for recommended operating parameters, based on the manufacturers operating manual and evaluated by internal check analysis using of standard solution of element as well as data selected carefully from Table 2.

For analysis of mercury and arsenic, a gas (hydride)/vapour generating system is coupled with ICP, instead of using of nebulizer. The mercury vapour/arsine generated through the system is carried by the carrier gas (Ar) to plasma torch, and other instrumental conditions shall be the same as above.

NOTE — Sensitivity, instrumental detection limit, precision, linear dynamic range and interference effects will be investigated and established for each individual analyte line on that particular instrument.

A-6.5 Procedure

A-6.5.1 *Calibration*

Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures, using the intermediate mixed standard solutions (**A-6.5.2**). The relationship between concentration and intensity is linear up to six orders of magnitude. Examine the spectra of the element and make necessary adjustments (if required) for the exact peak positions and baselines to ensure proper measurements of the respective peak intensities. Flush the system with the reagent blank solution between each standard.

A-6.5.2 Before beginning the sample run, re-analyse the reference standard with the highest concentration as if it were a sample. Ensure that the concentration values do not deviate from the actual values by more than ± 5 percent (or the established control limits, whichever is lower). If they do, follow the recommendations of the instrument manufacturer to correct for this condition.

Begin the sample run by flushing the system with the reagent blank solution between each sample. It is recommended to analyse a calibration check solution and the calibration blank solution every 10 samples. Analyze the sample solution and calculate the concentration in µg/ml of the iron in the sample solution.

NOTE — It is recommended that IS 3025 (Part 2)/ ISO 11885 may be referred and practiced for ensuring precise and reproducible analysis.

A-2.6 Calculation

The mass concentrations for each element are determined with the aid of the instrument software by following steps:

a) Relate emission signals from calibration blank and calibration solutions with the signals from reference elements and establish a calibration plot; and
b) Determine the mass concentrations of samples with the aid of the emissions and the calibration graphs and calculate the quantity in mg/kg of the constituent elemental impurities in the sample, by multiplying the value by 20 (dilution factor).

ANNEX B

(*Clause* 5)

SAMPLING OF STABILIZED LIQUID SULPHUR TRIOXIDE

B-1 GENERAL REQUIREMENTS

B-1.1 Samples shall not be taken in an exposed place.

B-1.2 The sampling instrument shall be clean and dry.

B-1.3 The material shall be sampled in liquid condition.

B-1.4 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

B-1.5 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples, from adventitious contamination.

B-1.6 The samples shall be placed in suitable, clean, dry and air tight glass containers, on which the material has no action.

B-1.7 The sample containers shall be of such a size that they are almost completely filled by the sample.

B-1.8 Each sample container shall be sealed airtight with a suitable stopper after filling, and marked with full details of sampling and the month and year of manufacture of the material.

B-1.9 Samples shall be stored in a dry place, between 17 °C and 30 °C.

B-2 SCALE OF SAMPLING

B-2.1 From Containers or Packages

B-2.1.1 *Lot*

All containers in a single consignment of the material drawn from a single batch of manufacture shall constitute the lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately, and the groups of containers in each batch shall constitute separate lots.

B-2.1.2 Sample shall be tested from each lot separately for judging the conformity of the material to the requirements of the specification. For this purpose 5 containers shall be selected at random from each lot.

NOTE — If the number of containers in the lot is five or less, the number of containers to be selected and the criteria for conformity of the lot to the specification shall be as agreed to between the purchaser and the supplier.

B-2.1.3 The containers shall be selected at random. In order to ensure randomness of selection, random sampling procedures given in IS 4905 may be followed.

B-2.2 From Tankers

Samples shall be taken from each tanker.

B-3 PREPARATION OF TEST SAMPLES AND REFEREE SAMPLE

B-3.1 For Packages or Containers

B-3.1.1 *Sampling Device*

The sampling device shall consist of a glass bottle (sampling vessel) with the necessary connections as shown in Fig. 2. The connecting tubes shall be made of glass or teflon. The samples shall be drawn from the containers from the bottom.

B-3.1.2 From each of the containers selected according to **B-2.1.3**, a small representative portion of the material, about 300 ml, shall be taken out with the help of the sampling device after thoroughly stirring the material with the help of a glass rod.

B-3.1.3 Out of these portions, a small but equal quantity of the material shall be taken out and thoroughly mixed to form a composite sample not less than 1 000 ml. The composite sample shall be divided into 3 equal parts, one for the purchaser, one for the supplier and the third to be used as a referee sample.

B-3.1.4 The remaining portion of the material from each container shall be divided into 3 equal parts, each forming an individual sample. One set of individual samples representing the 5 containers sampled shall be marked for the purchaser, another for the supplier and the third to be used as a referee sample.

B-3.1.5 All the individual and composite samples shall be transferred to separate bottles. These bottles shall be sealed and labelled with full identification particulars.

B-3.1.6 The referee samples consisting of composite sample and a set of 5 individual samples shall bear the seals of purchaser and the supplier. They shall be kept at a place agreed to between the purchaser and the supplier to be used in the case of a dispute between the two.

B-3.2 For Tankers

A sampling device similar to that prescribed in **B-3.1.1** and of suitable dimension shall be employed for taking out the samples. Samples shall be taken out from the bottom so that in all 1 litre is taken out. The material shall be thoroughly mixed and divided into 3 equal parts, one for the purchaser, another for the

supplier and the third for the referee. These samples shall be transferred to separate bottles. The bottles shall be sealed and labelled with full identification particulars.

B-4 NUMBER OF TESTS

B-4.1 For Containers or Packages

B-4.1.1 Tests for the determination of free sulphur trioxide content shall be performed on each of 5 individual samples.

B-4.1.2 Tests for all characteristics given in **3** except free sulphur trioxide, shall be performed on the composite sample.

B-4.2 For Tankers

Tests for all the characteristics shall be carried out on the sample prepared for each tanker.

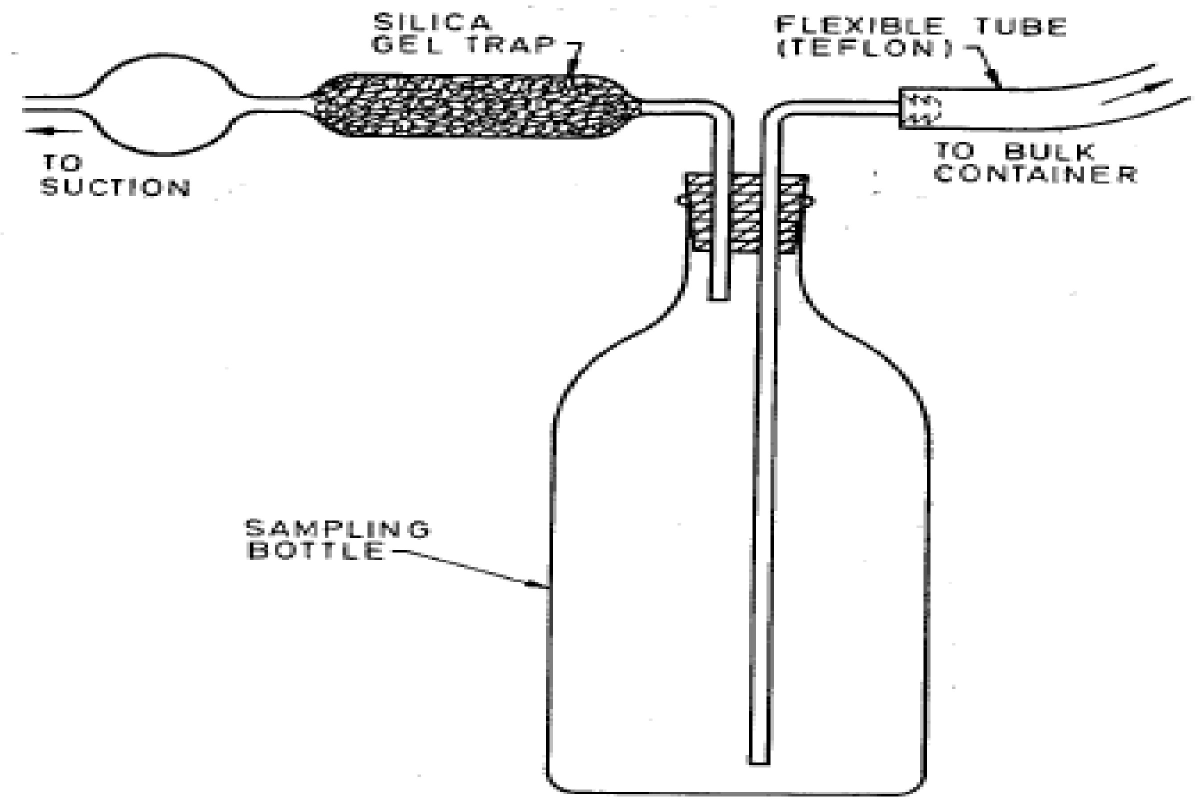

FIG. 2 SAMPLING INSTRUMENT FOR LIQUID SULPHUR TRIOXIDE, STABILIZED

B-5 CRITERIA FOR CONFORMITY

B-5.1 For Containers or Packages

B-5.1.1 *For Individual Samples*

From the 5 test results for free sulphur trioxide content, the mean ($\bar{X}$) and range (R) of test results shall be calculated (range being the difference between the maximum and minimum values of test results).

B-5.1.1.1 The lot shall be declared as conforming to the requirement for free sulphur trioxide if the value of the expression ($\bar{X}$ — 0.6 R) as calculated from the test results is greater than or equal to the minimum value specified in **3**.

B-5.1.2 *For Composite Sample*

For declaring the conformity of the lot to the requirements of all other characteristics tested on the composite sample, the test result for each of the characteristics shall satisfy the relevant requirements specified in **3**.

B-5.2 For Tankers

For declaring the conformity of the material in a tanker, the test result for each of the characteristics shall satisfy the requirements prescribed in **3**.

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Inorganic Chemicals Sectional Committee, CHD 01

Organization	*Representative(s)*
Central Salt and Marine Chemicals Research Institute, Bhavnagar	DR KANNAN SRINIVASAN ***(Chairperson)***
Alkali Mfrs Association of India, Delhi	SHRI K. SRINIVASAN SHRI H. S. DAS (*Alternate*)
Bhabha Atomic Research Centre, Mumbai	DR A. V. R. REDDY DR S. N. ACHARY (*Alternate*)
Central Drugs Standard Control Organization, New Delhi	DR RAMAN MOHAN SINGH
Consumer Voice, Delhi	SHRI M. A. U KHAN SHRI K. C. CHAUDHARY (*Alternate*)
Delhi Jal Board, New Delhi	SHRI ASHUTOSH KAUSHIK
Directorate General of Quality Assurance (DGQA), New Delhi	DR GURBACHAN SINGH SHRI B. S. TOMAR (*Alternate*)
Geological Survey of India, Kolkata	SHRI P. V. V. R SARMA
Global Adsorbents Pvt Ltd, Kolkata	SHRI SANJAY DHANUKA
Grasim Industries Ltd, Nagda	SHRI ALOK SINGH SHRI PANKAJ GUPTA (*Alternate*)
Gujarat Alkalies and Chemicals Ltd, Vadodara	SHRI V. K. MAHIDA SHRI SHAILESH PATEL (*Alternate*)
Hindalco, Mumbai	SHRI NAGESWAR KAPURI SHRI AJITH RAMACHANDRA (*Alternate*)
Hindustan Lever Ltd, Mumbai	MS VRINDA RAJWADE SHRI SOJAN VARGHESE (*Alternate*)
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